

Remarks

The present application was filed October 24, 2000 with original claims 1-14. The first Office Action (Paper No. 7) mailed September 5, 2003 rejected all of the claims 1-14.

The Applicant has hereinabove amended the title of the application, cancelled claims 7-11 and 14, amended claims 1-6 and 12-13, and added new claims 15-24.

The amendments to claims 1-6 and 12-13 have been made to broaden the claims by removing unnecessary limitations, as well as to add language to make more explicitly clear that the recited “radial positional offset” distance is a distance along the radius of the respective recording surfaces. This is what those skilled in the art would have immediately and readily understood a “radial positional offset” to describe. See, e.g., the specification at page 13, line 17 to page 14, line 14; page 14, lines 20-25; and FIG. 9. Thus, these amendments are clarifying in nature, do not narrow the scope of the subject matter over that which was originally claimed, and will have no preclusive effect during subsequent proceedings.

New apparatus claims 15-19 have been provided in lieu of cancelled claims 7-11 and are generally directed to the broadened and clarifying language of claims 1-6 discussed above. New claims 15-19 are further directed to a “data storage device.” The title of the application has been similarly amended. Support for these amendments is found in the specification at page 1, lines 13-14.

New method claims 20-24 also generally correspond to the broadened and clarifying language of amended method claims 1-6 discussed above. Support for these claims is further found in the specification at page 15, line 8 to page 16, line 1; and the flow chart of FIG. 10.

These amendments are believed to be proper, do not introduce new matter, and place the application in proper condition for reconsideration. With the entering of these amendments, the status of the claims is as follows:

<u>Claim</u>	<u>Status</u>
1 (Once Amended)	Independent.
2 (Once Amended)	Depends from claim 1.
3 (Once Amended)	Depends from claim 1.
4 (Once Amended)	Depends from claim 1.
5 (Once Amended)	Depends from claim 4.
6 (Once Amended)	Depends from claim 4.
12 (Once Amended)	Independent.
13 (Once Amended)	Depends from claim 12.
15 (New)	Independent.
16 (New)	Depends from claim 15.
17 (New)	Depends from claim 15.
18 (New)	Depends from claim 17.
19 (New)	Depends from claim 17.
20 (New)	Independent.
21 (New)	Depends from claim 20.
22 (New)	Depends from claim 21.
23 (New)	Depends from claim 21.
24 (New)	Depends from claim 20.

Objection to Claim 11

The first Office Action objected to claim 11, correctly noting that this dependent apparatus claim improperly depended from independent method claim 1. The Applicant has cancelled claim 11, and so the cancellation of this claim obviates the objection.

Rejection of Claims Under 35 U.S.C. §102

The first Office Action rejected claim 12 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,729,718 issued to Au (“Au ‘718”) and as being anticipated

by U.S. Patent No. 5,854,941 issued to Ballard et al. ("Ballard '941"). These rejections are respectfully traversed and will be discussed in turn.

1. Proper Construction of Claim 12 Means-Plus-Function Element

Claim 12 is written in accordance with 35 U.S.C. §112, sixth paragraph and includes "means for scheduling a plurality of pending access commands from a host computer to access a corresponding plurality of destination tracks on different recording surfaces each having an associated target head different from a presently active head, by determining a corrected seek time for each of the pending access commands which accounts for *radial positional offset distance* between the presently active head and the associated target head along the respective recording surfaces." (claim 12, emphasis added).

The corresponding structure disclosed in the specification that carries out this recited function is the control processor 140 programmed to carry out the routine 192 of FIG. 10. See page 15, lines 3-7. This structure accounts for a *radial positional offset distance* between the presently active head and the associated target head, as shown in FIG. 9, and as represented by the operation of steps 196, 198, 200 and 202 in FIG. 10.

Accordingly, the Examiner is obliged as a matter of law to construe this means element as this structure, and equivalents thereof. See *B. Braun Medical, Inc. v. Abbott Lab.*, 43 USPQ2d 1896, 1900 (Fed. Cir. 1997); *In re Donaldson Co. Inc.*, 26 USPQ2d 1845 (Fed. Cir. 1994)(*en banc*); *In re Dossel*, 42 USPQ2d 1881 (Fed. Cir. 1997); *Supplemental Examination Guidelines for Determining the Applicability of 35 U.S.C. 112, Para. 6*, 65 FR 38510.

2. Au '718

A review of Au '718 shows that this reference fails to account for a radial positional offset distance, as claimed. The Examiner correctly notes that Au '718 identifies a “ Δ head” value at equation (4) (Au '718, col. 4, line 34).

However, when Au '718 is read in context it is clear that what is under consideration by the Δ head value is *head switch time*, not a radial positional offset distance. In col. 4, beginning at line 6, the reference defines “lead time” as rotational latency plus the greater of the required “seek time” or “head switch time”. (See equation (1) and col. 4, lines 10-14: “Henceforth in this discussion, ‘seek time’ is generalized to mean the greater of *the time required to switch heads* and the time required to move the head from the source track to the destination track, and is shown as the second term on the right side of Equation (1).” (emphasis added))

The reference continues with equations (2) and (3) which define the seek *time* as a value “ Δ cylinder,” which is the absolute value of the elapsed time required to move from the source cylinder to the destination cylinder. See col. 4, lines 16-30.

In this context, the reference then says “*Similarly, Δ head is the absolute value of the difference between the destination head ‘head_{dest}’ and the source head ‘head_{src}’ as shown in Equation 4.*” (Au '718, col. 4, lines 30-32, emphasis added). Thus, it is unequivocal that “ Δ head” represents the head switch time between the source head and the destination head, not a radial offset position distance, as claimed.

This is further confirmed by the fact that Au '718 is *wholly silent* with regard to taking into account any such head positional offsets in determining estimated seek times, but rather *assumes* that all of the heads are nominally aligned over the respective tracks in

the source cylinder. See, e.g., col. 8, lines 1-11; Table 1 in col. 7 (no mention of head-to-head offset as being included in the parameters relating to each “queue record”); col. 9, lines 19-33; and the diagrams/flows of FIGS. 8-10.

While Au ‘718 is clearly motivated to provide efficient queued command scheduling based on accurate estimates of access times for each queued command, the reference fails to recognize that head-to-head radial position offsets can affect the actual time required to carry out a given access command because the *actual* distance between the target head and the destination track is *different* than the distance between the initial and final cylinders. Accordingly, Au ‘718 is deficient with respect to the claimed subject matter and the Applicant respectfully requests reconsideration and withdrawal of the rejection.

3. Ballard ‘941

With regard to Ballard ‘941, the Applicant respectfully submits that this reference likewise fails to disclose accounting for a radial positional offset distance as claimed. As with Au ‘718 discussed above, Ballard ‘941 reduces access times by using a “track offset” technique in which the sectors in each cylinder are skewed (at different angular positions on each disc surface), but otherwise assumes that all of the heads are aligned over the respective tracks in each cylinder. See, e.g., FIG. 5; col. 7, line 54 to col. 8, line 7; col. 8, lines 30-46; and col. 8, lines 55-65.

Ballard ‘941 does take into account which head is the target head in determining the distance between the initial and destination cylinders (the value “ Δ cyl”) – see step 2, col. 8, lines 47-50. However, this is to take into account the rotational latency due to the angular location of the destination sector, *not radial positional offset distances* from head to head.

Indeed, as with Au '718, Ballard '941 appears to assume that all of the heads are nominally aligned over the tracks in each cylinder. See, e.g., col. 9, lines 9-11.

Thus, it would be unreasonable to consider taking into account the *vertical* placement of the target head within the head array as corresponding to a radial positional offset distance, as claimed. This is further unreasonable in view of the clarifying claim amendment above which identifies the radial offset position distance as being *along the respective recording surfaces*.

Accordingly, the Applicant submits that Ballard '941 likewise fails to anticipate claim 12 and requests reconsideration and withdrawal of the rejection of this claim.

Rejection of Claims Under 35 U.S.C. §103

The first Office Action further rejected claims 1-11 and 13-14 under 35 U.S.C. §103(a) as being obvious over Au '718 in view of Ballard '941. This rejection is respectfully traversed.

The deficiencies of Au '718 and Ballard '941 have been discussed above. It is significant that both Au '718 and Ballard '941 fail to recognize that head-to-head radial positional offset distances *exist* (as claimed), much less teach or suggest a methodology or apparatus that could be used to take such offsets into account in scheduling an access command.

Accordingly, there is nothing in the prior art that would motivate one skilled in the art to combine the teachings and suggestions of these references to arrive at the claimed combination, or an obvious variant thereof. The Applicant therefore respectfully requests reconsideration and withdrawal of the rejection of these claims under §103(a).

New claims 15-24 are also believed to be patentable over the art of record for the reasons stated above, and therefore the Applicant further requests examination and allowance of these claims as well.

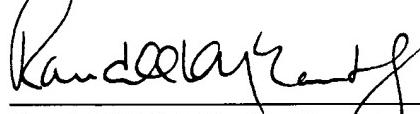
Conclusion

The Applicant respectfully requests reconsideration and allowance of all of the claims pending in the application. This is intended to be a complete response to the first Office Action (Paper No. 7) mailed September 5, 2003.

Should any questions arise concerning this response, the Examiner is invited to contact the below signed attorney.

Respectfully submitted,

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